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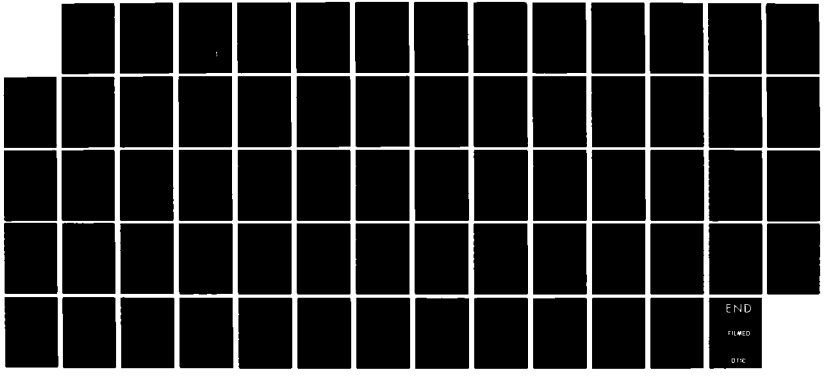

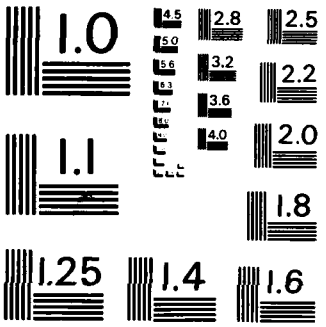

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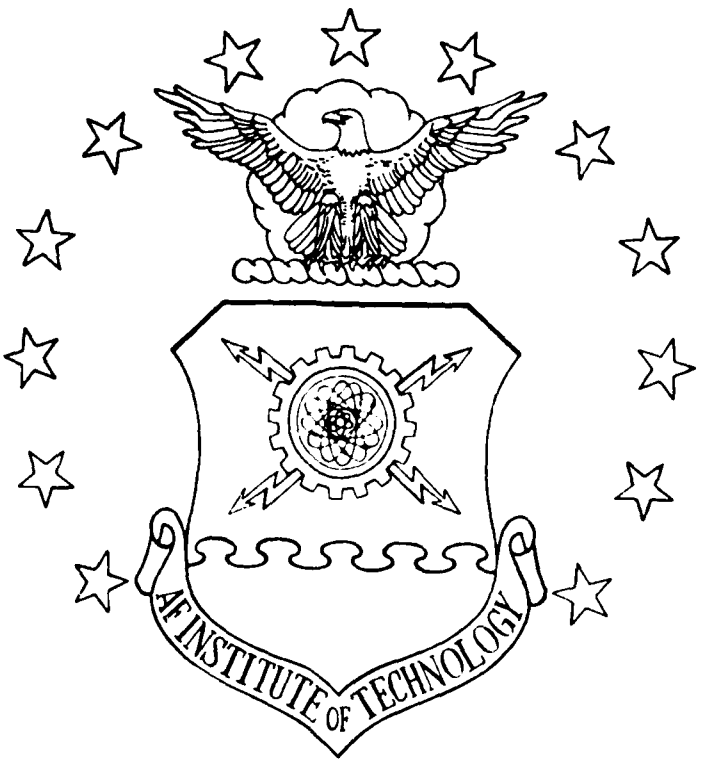

MAINTENANCE MANAGEMENT IN THE AIR FORCE COMMUNICATIONS COMMAND: A FORWARD LOOK

THESIS

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MAINTENANCE MANAGEMENT IN THE AIR FORCE COMMUNICATIONS COMMAND: A FORWARD LOOK

THESIS

Presented to the Faculty of the School of Systems and Logistics

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Carol D. Risher

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Abstract

The Air Force Communications Command (AFCC) is subject to external pressures which influence management structures and decisions. Four external pressures currently influencing AFCC are technology advances, budgetary and demographic considerations, and the Soviet threat. This thesis examines those pressures and AFCC initiatives to cope with them. Twenty-four managers in AFCC were interviewed in an exploratory survey to determine what effects these pressures and the AFCC initiatives will have on maintenance management at the unit level in AFCC.

Four recommendations are made. First, functional alignment of the units, with overhead manning based on mission and types and numbers of units supported, is suggested. Second, AFCC should examine the maintenance data collection program to determine if changes are needed. Third, AFCC should make maintenance analysis optional at the unit level. Fourth, AFCC should examine the feasibility of funding a civilian study of current regulations.

MAINTENANCE MANAGEMENT IN THE AIR FORCE COMMUNICATIONS COMMAND: A FORWARD LOOK

I. Introduction

General Issue

The Air Force Communications Command (AFCC), like all military components, is subject to external pressures which influence management structures and decisions. Four external pressures are currently influencing the Air Force and the Air Force Communications Command to examine their management structures: the tremendous advances in technology, both presently available and expected in the near term; budgetary pressures which force managers to attempt to do more with less; population demographics which will provide the military with a smaller pool from which to recruit qualified men and women; and the omnipresent Soviet threat. Managers are always alert for ways to most effectively and efficiently exploit positive influences and neutralize negative influences, and the Air Force has, within the past five years, undertaken three initiatives toward this end.

Higher Reliability/Maintainability. On 11 May 1984, HQ USAF/LEY issued the USAF Master Plan for Ground C-E Maintenance. This plan was only one of many documents in which HQ USAF

asserted its intention to deviate from past practices in the purchase of new military systems. In the future, new systems will be required to have significantly higher levels of reliability and maintainability than present systems, and many items will have built-in test equipment for rapid and accurate fault isolation. In addition, communications-electronics items will have a high percentage of Line Replaceable Units (LRUs) (for example, electronic cards) which, when detected as faulty by the built-in test equipment, can be removed and replaced by operators who have been minimally trained in maintenance skills. Most, or all, or the reparable LRUs will be turned in to the supply system and sent to a regional center for repair by trained maintenance technicians (7:1-4).

Data Automation Merger. On 11 April 1984, HQ USAF issued Program Action Directive 84-1, ordering the integration of data processing and telecommunications activities at base level (5:1). Studies undertaken by the Air Force had concluded that such a move was necessary both to cope with the merging of the two areas due to technological advances and to decrease manpower and increase efficiency through integration (5:2).

Dispersal. On 11 June 1982, the Department of the Air Force released the Air Force 2000 study, a document which described military expectations for the global environment of the next several decades. As the study stated, "The ability to provide combat-

configured support at vast numbers of dispersed operating locations is fundamental to the support strategy for the 21st century (4:14)." Furthermore, the study concluded that, contrary to their experiences in previous conflicts, military managers could no longer assume that communications facilities would not be specific targets for attack. Advances in encryption techniques and

> the growing importance of intelligence, communications, and computer systems to the employment of airpower practically ensures that these systems will be specifically targeted for physical destruction or electronic disruption (4:148).

The study suggests redundancy combined with a wide proliferation of systems as the best solution to counter this situation.

Specific Problem

These three initiatives will have an effect on AFCC management, but what effect? More specifically, how will these initiatives, and the four factors which are providing their impetus, affect maintenance management at the unit level in the Air Force Communications Command?

II. Literature Review

Higher Reliability/Maintainability

Reliability and maintainability initiatives are not new concepts. On August 21, 1952, the Office of the Secretary of Defense (Research and Engineering) established the Advisory Group on Reliability of Electronic Equipment (AGREE), and "many of today's tasks, approaches and techniques find their origin in AGREE efforts." One of AGREE's task groups suggested that acceptably reliable systems would require improved components, and their recommendations were responsible for a study which was released in May 1960 by the Ad Hoc Study Group on Parts Specification Management for Reliability. In the mid-1970's, more emphasis was placed on the link between reliability and costs, and the roles of warranties and incentives were studied. On July 8, 1980, DoD Directive 5000.40, the "DoD Directive on Reliability and Maintainability," was published, followed shortly thereafter by the Defense Acquisition Improvement Program in April 1981 (13:15-16). Major General Gerald L. Prather, Commander of AFCC, stated in a 13 January 1985 letter to Lieutenant General Leo Marquez, USAF/DCS, Logistics and Engineering, that he has "set reliability and maintainability as the highest goal in engineering and acquiring information systems (16:1)."

What are reliability and maintainability and why has so much

emphasis been placed on them? Reliability has been defined as "the ability to depend on something," a "necessary requirement for any operating equipment." Maintainability is inherent in the design features of an equipment item; a high level of maintainability allows maintenance to be rapid and simple. Maintainability could be viewed as a counter-balance to reliability. Equipment which is 100% reliable does not need maintainability. Low reliability, however, makes high maintainability essential (11:24-25).

The initiative to purchase more highly reliable/maintainable equipment is a response to all of the four external pressures previously mentioned: technology, manpower, cost, and threat.

Technology. The first, and most immediately compelling, reason to strive for higher levels of equipment reliability and maintainability is to take advantage of technology which is currently available or expected to be ready for inclusion in equipment items in the near future. The Department of Defense has funded a six-year program to develop Very High Speed Integrated Circuits (VHSICs) which will be "very fast, have a very high functional density, low power consumption, built-in self test features, high reliability and are radiation hardened (14:54)." According to "Puckett's Law," an electronics design can be improved yearly

> by a factor of nearly two over the previous year; that for a given cost and performance, weight can be reduced by a factor of two; that for a given weight and cost, performance

> can be increased by a factor of two; and that for a given cost, weight, and capability, reliability can be increased by a factor of two (10:14-15).

Given that the technology is available, the Air Force intends to incorporate it as much as possible into systems.

Cost. The production of highly reliable equipment often requires the highest quality, most costly parts available, and the systems are frequently heavier and larger than less reliable equipment. When a choice must be made between levels of reliability and operational performance, military managers have been reluctant to choose the former over the latter (11:26). But increasing budget constraints have caused a change in military philosophy, and emphasis has been shifted from purchase costs to life cycle costs. A choice must now be made between highly reliable equipment with decreased logistics support or less reliable equipment with higher levels of support (12:4). If reliability is chosen, equipment can often be made twice as reliable for less than twice the original cost. This has the effect of doubling the equipment inventory, and, in addition, logistics support costs will decrease, leading to significant savings in manpower, maintenance equipment, and facilities costs (10:13).

Manpower. The savings in manpower has become a particularly important issue. Population projections for the next few decades indicate that the number of young people available for military recruitment will rapidly decline, while the demand for people with

technical skills and abilities will intensify. The military may find it increasingly difficult to attract qualified recruits, and the number of technicians needed today to support equipment may not be available in twenty years with an all-volunteer force (1:17).

Threat. While technology, cost, and manpower are important considerations, combat effectiveness must necessarily take precedence. According to a 1982 Army Science Board report,

> high system reliability would appear to be an essential factor in the implementation of new battlefield concepts, such as Air-Land Battle 2000, which assumes autonomous, functioning units (8:17).

The USAF Master Plan for Ground C-E Maintenance confirms that "smaller, self-sufficient forces (7:4)" are essential. The United States currently leads the Soviets by five to ten years in many of the basic technologies (e.g., microelectronics, computers, jet engines) (15:1), but technology leaks and transfer exports from the West have enabled the Soviets to obtain unknown numbers of state-of-the-art equipment items and designs (2:108). At the same time that the Soviets are improving their systems with foreign technology, they are able to exact rigid controls over domestic designs and establish testability standards, one common test program language, and a commonality of automatic test equipment hardware (2:109), programs that the American military has been reluctant or unable to undertake.

Data Automation Merger

The merger between the data automation and communications-electronics fields resulted from the ever-increasing intermingling of the two fields due to technological advances. Computer systems are increasingly heralded as the solution to many problems in AFCC, including such diverse areas as data collection and personnel training. A 1981 Defense Science Board Summer Study Panel evaluated which technologies would have the most effect in the future. Six of the top eight dealt with "computer technology or the electronics associated with computer technology (1:16)." The same panel, however, concluded that the increasing complexity would cause no significant degradation of readiness if effectively managed (18:11).

Dispersal

AFCC is a support command and must tailor its mission in accordance with the missions of the parties it supports. Air Force 2000 states that "support structure vulnerability" must be reduced by "emphasizing mobility, flexibility, and survivability (4:13)." The substitution of capital for labor is fundamental to this plan, and the study urges Air Force organizations to actively investigate ways to streamline their organizational structures (4:23-24). At the same time, the Air Force asserts that survivability will be improved by a greater dispersal of Air Force equipment, facilities, and weapons systems. Since little, if any, opportunity will be allowed for a

transition from peacetime to wartime activities in a future conflict, assets must be prepositioned in dispersed locations to assure maximum survivability. Above all, the Air Force must organize for war and then operate within that structure. Under this concept, management will necessarily be inefficient (3:5). The key is to decrease that inefficiency as much as possible without losing the wartime perspective.

AFCC Initiatives

HQ AFCC has already begun the merger of the communications-electronics and data automation fields. In addition, it has initiated several projects which, if brought to fruition, will support the Air Force commitment to higher reliability/maintainability. The AFCC Concept for Regionalization of Ground Communications-Electronics Maintenance, dated 22 May 1984, describes a regional maintenance concept which has highly reliable equipment as its basis (17:1-5). While this concept is still in the planning phase, other test programs of a much more limited scope are underway. Approval was given to the ARINC Research Corporation for a feasibility demonstration of a TRACALS evaluation center. The ARINC project will use remote monitoring devices at four locations, all of which are linked by computer to a fifth site. One of the stated purposes of the test is to establish the effects of a decrease in technicians and skill levels at the remote sites, with a goal of ultimately eliminating all technicians

except those located at the central facility (9:1-1 to 1-4). Limited regional maintenance concepts have existed in AFCC for years, but an evaluation which may lead to command-wide centers is new.

There was little evidence of programs to provide for greater equipment dispersal. This was not surprising, since Air Force 2000 is not directive in nature, and no actions have been directed by Air Staff to date, to the best of the author's knowledge.

III. Research Methodology

Justification of Research Approach

This research is an exploratory survey. No observable data exists and no hypothesis has been asserted. The research does require opinions based on individuals' experiences and knowledge, and responses which cannot be selected from a limited set of answers. For these reasons, a semi-structured interview guide (Appendix) was compiled which would ensure coverage of key areas while allowing open responses and the flexibility to address related subjects. Due to the wide range and complexity of the subject area, only a limited number of interviews could be held, so a purposive, non-probabilistic sampling method was chosen.

Sample/Population

Twenty-four Air Force Communication Command personnel were selected and interviewed, thirteen in person and eleven by telephone. Selection was based on three criteria: current assignment, experience, and rank.

Current Assignment. Maintenance managers are found at the unit, division, and command levels of AFCC. For the purposes of this research, managers will be referred to as being at the "unit level" or "staff level." Unit level managers are assigned to

TABLE I

Interviews of Unit Personnel by Complex Category

Complex Category	Number of AFCC Complexes	%	Number of Interviews	%
I	70	49	4	40
II	42	30	3	30
III	26	18	2	20
IV	4	3	1	10
	142	100%	10	100%

maintenance complexes and responsible for the accomplishment of maintenance for specific items of equipment assigned to their unit. Staff level managers are assigned to either division or command headquarters. In selecting personnel for interviews, it was deemed desirable to have inputs from personnel currently assigned to both unit and staff level positions in order to get a balance of views.

Maintenance complexes at the unit level are divided into four categories according to size (functionally supported maintenance activities were not included) and the ten interviews held at this level were divided into maintenance complex categories in the same approximate percentages that those complexes represent in AFCC (Table I). Fourteen personnel were interviewed at the staff level.

TABLE II

Mean Years of Experience

Position	Sample Size	Experience (to nearest tenth)				
		AF C-E	LG/ LGM	Mx. Mgr.	Mx. Staff	Combined Mx. Mgt.
Unit Officers	6	7.1	3.2	0.7	0.8	4.7
Unit EM	4	20.5	3.3	11.3	1.8	16.4
Staff Officers	9	15.5	3.6	2.2	3.0	8.8
Staff EM	5	18.5	0.0	7.5	5.8	13.3
Combined	24	14.9	2.7	4.4	2.8	13.8

Experience. The second criteria for selection was based on experience. At the unit level, the individual interviewed was the chief of maintenance and had been in that position for at least one year. At the staff level, individuals were not required to be currently in a maintenance management position, as long as they had a minimum of five years combined experience as a maintenance manager, chief of maintenance, and/or maintenance staff officer/NCO (Table II).

Rank. The third criteria was rank. Officers are currently authorized in 76 percent of the chief of maintenance positions; non-commissioned officers in 24 percent. Enlisted personnel were over-represented in the interviews (Table III). This was a deliberate

TABLE III

Interviews by Rank (Total)

Rank	No. Authorized as LG/LGM	%	Number of Interviews	%
Officer	105	74.5	15	62.5
Enlisted	36	25.5	9	37.5
Total	141*	100 %	24	100 %

* One Position is Contracted

TABLE IV

Interviews by Rank (Breakdown)

Rank	Number Interviewed	Rank	Number Interviewed
0-6	2	0-2	2
0-5	5		
0-4	3	E-9	6
0-3	3	E-8	3

action designed to take advantage of their superior experience levels, as experience levels were determined to be more important than rank. Table IV provides further detail by listing the individuals interviewed by rank.

Instrument

Twenty-two of the twenty-four individuals received the interview guide at least one day prior to the interview. The interviews required that individuals set forth their opinions on what effect the three Air Force initiatives (listed as trends in the guide) will have on AFCC maintenance management. The discussions focused on those responsibilities currently required by AFCCR 66-9, Maintenance Management: Communications-Electronics Equipment Maintenance (6:1-1 to 8-2). Individuals were questioned on what changes could be reasonably expected to take place in the next few decades, as well as conjectures on any new responsibilities. Individuals were requested to approach the subject both from a standpoint of what could and should occur.

Individuals were briefed at the beginning on the purpose of the research, no disguise being deemed necessary or desirable. Anonymity was assured to permit controversial and sensitive subjects to be addressed, as well as to avoid undue emphasis on any one individual's responses.

Interviews began with a brief background of the research and the three trends which the author feels will affect maintenance management most heavily: requirements for higher reliability and maintainability, the merger of the data automation and communications-electronics fields, and the expectation of greater equipment

dispersion in future plans. Then the focus shifted to the basic assumptions of the individual being interviewed. They were asked what changes they expect to occur in equipment, personnel, and siting. After basic assumptions had been established, questioning moved to the four basic areas of responsibility in the maintenance complex: maintenance activities, maintenance control, quality control, and chief of maintenance responsibilities. These represent a progression of control in maintenance and provided a logically structured sequence. However, this progression did not always occur in the interviews. Individuals were permitted and encouraged to discuss those subjects which they deemed important as well as respond to subject areas specifically addressed by the interviewer. Individuals were also questioned on the "big picture," the maintenance complex categories, although this subject did not necessarily occur at the completion of the interview. At the completion of the interviews, individuals were requested to read through the interview guide and asked if there were any other areas listed which they wished to address that had not yet been discussed. This procedure was followed in every interview except two, which were curtailed by time constraints on the persons interviewed. Since no individual commented on every single item listed in the interview guide, the failure of any item to have a large number of comments cannot be assumed to indicate a lack of interest on the part of those interviewed.

All interviews were taped with the knowledge and permission of the individuals. After transcription, a typed copy of the interview, edited for clarity and brevity, was mailed with a request that it be reviewed to ensure that no inadvertant modification of their views had been made. Individuals were also invited to add comments on any areas which they had not previously covered but wanted included.

Where possible, quotations from the interviews support the assertions of those interviewed; however, the interviews are identified by number to protect the anonymity of the subjects. To separate the interviews from published sources, interviews are cited in brackets with the interview number, e.g., [I22]. The interview tapes, transcripts, and data information will be retained for five years by the author and will be available only to persons doing research who have a legitimate need for this material.

IV. Findings: Trends and Assumptions

Trends

Every interview began with a request that the individual being interviewed state whether they believed that the three identified Air Force initiatives were the trends which would most significantly affect maintenance management in AFCC in the future. They were also asked if there were any other trends which they believed deserved inclusion.

Higher Reliability/Maintainability. Twenty of the twenty-four respondents agreed that the initiative to increase higher reliability/maintainability (R/M) in equipment will have a major effect on maintenance management in AFCC. Agreement was indicated by either citing R/M individually or in combination with one or both of the other two items. Three individuals specifically stated that R/M would be the most significant trend, two stating that it is "going to be the driving factor(s) for everything [I24]" and it would have "profound effects on the way that communications maintenance and information systems maintenance is organized and addressed [I4]." The third individual predicted that "reliability and maintainability is, in fact, going to force us into a mode where maintenance management . . . is going to disappear [I10]." Two individuals linked this trend with the cost and manpower aspects discussed in the literature

review, one stating

> You're going to have two choices. You're either going to have to spend money on reliability or you're going to have to spend the money on manpower, and there's no third option [I24].

One person linked the need for increased reliability/maintainability to the threat.

> It doesn't make sense to me to have a combat system that's reliant on non-combatant people to keep it going, because that just increases the number of bodies you've got to move, the amount of materiel you have to move, et cetera, et cetera. If you keep it to a minimum, you can move faster and better [I18].

Data Automation Merger. Fewer people agreed on the effect of the merger with data automation on maintenance management. Only three people stated that it would have a strong effect.

Seven more individuals agreed that the merger would affect maintenance management, but in these cases, this trend was mentioned in conjunction with one or both of the other trends, and no other statement was made about this initiative. Five individuals stated that the merger would have little or no effect. The remaining nine individuals made no comment.

Dispersal. Eleven individuals responded positively to this initiative, but eight mentioned it in combination with both other trends and made no further statement. The three individuals who made specific statements did not discuss specific plans by AFCC to disperse communications equipment, but rather made predictions on the effect to maintenance management if they do.

> Rather than have a consolidated maintenance management at unit level, you might have a manager at unit level, but you will have the people that are being managed dispersed to many locations, which will make your span of control extremely difficult. So our managers are going to have to really be of top quality to be able to stay on top of such a widely dispersed group of people. It's going to take our existing problems and exaggerate them [I24].

A second person felt this was a positive initiative, citing the dangers inherent in clustering equipment items and spare parts too closely.

> We stack all this wartime readiness materiel and we put it right on the base that's going to get hit. So I come over as a guardsman to restore this place and I know I've got a prepositioned asset. I walk over and where is it [I2]?

Six stated that they were not familiar with the study or could not remember its recommendations, and the remaining seven individuals made no comment.

Assumptions

Individuals were questioned on what major changes they expected to occur in AFCC maintenance with respect to equipment, manpower and personnel, and locations. While contract maintenance was not listed in the interview guide, numerous responses resulted in its inclusion in this section.

Equipment. Sixteen individuals indicated that the most significant change in equipment, besides the aforementioned increase in R/M, would be a shift toward more black box or remove and replace

components. While this was perceived favorably in all cases, seven individuals indicated that the new equipment would almost certainly be supplemented by older, less reliable and less logistically supportable equipment. All seven indicated that while the retention of older equipment was undesirable, limited funds would preclude rapid replacement. As one individual stated, the aging equipment is "expensive to maintain, it's a nuisance to maintain, it keeps us from making some management changes that probably would increase our flexibility or our effectiveness [I4]."

Eleven individuals discussed the possibility of increasing purchases of "off-the-shelf" equipment. This was seen as a positive step from several aspects: decreased procurement times, decreased costs, higher reliability, and more rapid introduction of current technology. One individual tied decreased costs to diminished military specifications for such items.

> A resistor that we can buy for two cents off the shelf in a store will cost the government two dollars, and the reason is milspecs. These same resistors are put into equipment that major manufacturers sell to the public. They do not sell rubbish because it would be too expensive doing repairs and replacements under their guarantees. The military piece of equipment is identical to the piece of equipment you've bought off the shelf, only it's gone through fifty additional tests, and those fifty tests accelerated the cost [I24].

Not all comments were favorable, however. The primary objections to off-the-shelf purchases centered on the uncertainties of

future logistics support and non-standardization, but General Prather's Hammer Combat initiatives were cited by one person as a move to overcome these problems.

> I think we need to be a big player in what's acquired out there to satisfy the CINCs' requirements because if we're a player from the start, over the life cycle of that particular system, we're going to be able to provide a better service to those CINCs than if we continue to operate as they have in the past, just going out and buying it off the shelf to satisfy the immediate requirement without looking down the road a year or two or five or ten years. What is it going to be like? Are we buying from a company that may not be that stable [I7]?

Personnel. Nine individuals stated that they expect to see overall AFCC manpower cutbacks in the next few decades, citing budgetary and demographic factors.

Locations. Nineteen individuals stated that they expect to see an increase in regional maintenance centers, where more highly skilled technicians would be assigned to repair equipment components, advise lesser skilled unit personnel on equipment maintenance, and deploy as expert troubleshooters as required. The establishment of these centers was perceived to be an effective management response to more highly reliable and maintainable equipment and the expected manpower cutbacks.

> That's the only way we're going to be able to survive. Right now, we're required to maintain a piece of equipment at above a 95% ready rate, so it's on-line all the time. The users of our equipment are going to have to accept a lower rate than that because the only way to accomplish rates like that is to have maintenance personnel on-site so they can respond immediately to outages [I24].

> We've always had the program of if the operator declares that it's mission essential, where possible, we've always tried to accommodate them. But the operator is now in the same crunch as the maintainer with manpower. Everybody understands the manpower crunch [I5].

Sites which would no longer be manned by maintenance personnel were discussed by a number of individuals, but nine agreed on one point: NAVAIDS equipment would continue to require on-site technicians. There was one dissenter.

> I have always thought there was overemphasis placed on the importance of the guys being right there . . . . There will be some tradeoffs to be made and I think this is one of them. I do not believe that air traffic control needs to be babysat as much as it is now [I19] . . . .

Contract Maintenance. While contract maintenance was not listed in the interview guide, this subject was discussed in a number of interviews. Sixteen individuals predicted that AFCC would be contracting more maintenance in the future than they are at present. Like regional maintenance, contract maintenance was perceived as a solution to cost and manpower problems.

> One, we're being faced constantly with cutbacks and rollbacks in our blue suit force. That's a reality, and of course that's politically and economically driven. To offset that, we're forced to go to contractor maintenance. Another reason is that some of these technologies are moving out so fast that to train a blue suit maintainer to cope with it, the cost would be prohibitive in terms of what we would get in terms of returns. For that reason, it's cheaper in the long run to just hire a contractor who has the trained people, test equipment, skills, log support, everything to keep the system on the air [I8].

Opinions varied on whether the expected increase in contract maintenance would improve or degrade readiness. Six individuals maintained that contractors would remain in areas where hostilities broke out, with some people citing experiences in Vietnam [I3, I11] and World World II [I8] as supporting evidence. Others were less confident.

> I have no problem with contracting within the continental limits of the United States, but I think they're starting to look at too much contracting in overseas locations where, if hostilities do break out, some of this equipment is going to be mandatory to keep our senior personnel advised of what's going on. If that type of equipment is contracted and the contractors decide it's getting too warm for them in that area and they leave, we could totally blind our leaders [I24].

V. Findings: Maintenance Management

Maintenance Activities

Skill Levels. Twelve individuals stated that future maintenance work centers will be staffed by less skilled personnel than at present. This change is expected to occur with the acquisition of more highly reliable and maintainable equipment. Six of these twelve also discussed the possibility of operator/maintainers, personnel who would perform both functions. Six additional individuals expected a shift to operator/maintainers, but did not specifically discuss lower skill levels. Two individuals, however, disagreed about the feasibility of combining the operations and maintenance functions.

> We're looking at a long power curve for training both of these people. If the system breaks, even if it's just idiot lights, that's going to take that operator away from doing his operations. If he has redundancy, you're going to have to have that operator there to continue the operations and maintain the system. I don't know if you're going to eliminate people or not [I23].

The second person cited air traffic control as a field which would not support an operator/maintainer.

> Proficiency suffers. If you have someone who is controlling traffic on a daily basis, it is a very high stress environment. You cannot ask them to control traffic for eight hours and then repair equipment for another four or five hours [I24].

A third individual, while supporting the idea of an operator/maintainer, expressed concern about software maintenance.

> I'm not sure that we'll ever have an individual who's going to maintain both the hardware and software . . . . It may be a crew that consists of one maintenance person and one software person. The maintenance person would be essentially an operator/maintainer and the software person would be a systems analyst [I3].

Maintenance Training. Four people stated that interactive computer training programs would become much more prevalent in the near future, and one suggested that emphasis should be placed on developing the training for those "older systems that we expect to remain in the inventory [I7]." Documentation was identified as a training area in need of improvement.

> We are continually having people come in and say you ought to do it this way, you ought to write it up this way, and our people are spending their time revising training plans, documenting training, instead of training their people. The other aspect of our approach to training is maintenance. We focus on task qualification and I'm not so sure we should do that. I think we should be focusing on end item qualification or system qualification [I13].

Three individuals believed that maintenance training could be centralized at the regional level.

> One of the things we're doing right now . . . is looking at a concept called the technical support activity . . . . People from the sites would be drawn in, given training, sent back out to the sites. We would more centralize the pool of technical expertise [I7].

Three individuals felt that career technician courses should be reinstated or expanded.

Other Maintenance Activities Issues. Three individuals cited corrosion control as a maintenance function which would need continued emphasis.

Ten individuals indicated support for bringing technical control into the maintenance complex, or in a role that combined maintenance and operations functions.

> It would be much healthier, I think, in terms of people working together and functionally expedient if the people who diagnose the problem in the system were one with the people who had to fix the problem once it was diagnosed [I8].

> Take your tech control type, someone that's got good fundamental electronics training theory and who is systems oriented, and give him a piece of equipment that does most of its own work, and that person operates the equipment. He can also remove and replace defective units, do troubleshooting, and with the use of remote monitoring to a central technical point elsewhere, could probably handle ninety-nine percent of all problems. And again, this is just parallel to what commercial industry does [I18].

Two people opposed this idea.

Six individuals cited maintenance data collection as a work center responsibility which needed improvement.

> I think that there would be fruitful grounds for an investigator to take a look and see what is actually happening with MDC data that we generate on a daily basis. Candidly, it serves very little purpose [I13].

A second person was more specific.

> My first boss at AFCC . . . told me he went to Sacramento one time and was talking to one of the functional managers and asked him where all this data we were sending up in the MDC system was going, and the FM showed him the wastebasket. That's a sin [I18].

Maintenance Control

Job Control. Most people expressed views of expected changes in job control, but these views covered several areas. Three individuals expressed concern over the skill levels of the personnel assigned to job control.

> They are going to have to be more educated people, in the technical area. In order to control all these advanced technologies and systems they will have to be trained to use computers so as to be able to track systematic functions and to find out how to eliminate certain problems [I14].

Four people suggested that technical control could be a solution.

> We need a focal point for the troubleshooting and controlling actions to eliminate a problem. I feel that job control and tech control would be an integrated organization . . . . Why do we have duplication of effort? Why do we not have a focal point [I10]?

> If I had a tech control, I don't see any reason to have a maintenance control. It's one or the other. You don't need both. One of the biggest problems between maintenance and tech control is cooperation. Rarely will you ever see maintenance and operations trying to go in the same direction. I think we could save bodies and eliminate one area of friction by getting them all under one hat [I20].

Three people suggested combining job controls at centralized bases.

> There would be a job control function at the control station and at the division. It's a layered effect. For example, 100 sites, 10 master stations, and then the division would be responsible for the 10 stations. So we're going to eventually have a job control function at each of the control stations and at the division, more or less a logistics relaying center, which will monitor the whole picture and therefore identify manpower resources or equipment resources to be transferred between stations [I3].

One person expected a change in emphasis for this function.

> It could be that you'll wind up with a kind of central coordinating activity called logistics . . . to keep track of what's going where, what's needed where, and to arrange for the appropriate technical assistance or technical skills if you needed them in order to keep your system operating or to make the changes necessary in your system [I4].

Three individuals indicated that they would like to see job control placed down in the work center.

> A Category III unit or even a Category II unit could function very well in that fashion. You don't need a middleman do that, in fact there's a lot of disadvantages to having a separate function of job control [I13].

One person disagreed.

Plans and Scheduling. Six people expected more extended time periods between preventive maintenance inspections, and four suggested moving PMI scheduling down to the work centers.

Materiel Control. Eighteen of the individuals queried stated that maintenance complexes could not function effectively without assigned materiel controllers.

> They provide a valuable liaison for the work centers with our base supply. Instead of having ten work centers calling supply and checking on things, they go to materiel control who handles that focal point with the base supply. Someone would have to do the function on the staff anyway if I didn't have the materiel control functions [I23].

Nine individuals, though, asserted that future materiel controllers will have a much more limited role in the future. They are expected to track fewer parts, both because of an increase in

equipment reliability and an increase in line replaceable units as opposed to bits and pieces.

> We've been talking about going from component maintenance to board type change out maintenance. We've been talking about centralized repair activities, in some cases, remote from the base. We've been talking about contractor maintenance. All of these speak to me of the drastic cutting back in the need for a materiel control function. The mat control is still going to have to be there to handle the LRUs. They're still probably going to have to handle test equipment, things like that. It's just that their responsibilities, the magnitude of their job, would be cut way back [I8].

Four people went further, seeing the possibility of eliminating the materiel controller as middleman through automation.

> What do I need a materiel controller for? If I have that Phase IV computer and it's properly loaded, I should be able to do the same thing, go right to base supply. I think it could be done within five to ten years because of the lead time in getting the kinks out of the Phase IV program . . . . I don't see we will need materiel control for more than another five or ten years, until we can get computer systems on-line [I2].

> Materiel control could be totally done away with if you automate, and it would do away with all of these items listed. DIFM control would be done automatically by the computer, WRSK the same way, TCTOs, NRTS, everything. You can put parameters on delivery times. You punch in your requirement at the time you order your part, and if the part cannot be delivered in that time, the system could be flagged so it would give an output to the people at depot to know this is an unacceptable delivery time. It could be fully automated very easily [I24].

As one person stated, "We're being driven by the base supply structure, so it's very difficult to say [I19]."

Two individuals were concerned about the skill levels of the materiel controllers. One individual cited the current problem of

being manned by very junior people [I13]. A second person felt that

> . . . we're going to deal with less minor parts, but at the same time, we're going to deal with more subassemblies and components and it may take more expertise to deal with the higher level subassemblies than with the pieces and parts, because you have to be a little bit familiar with the function of the subassembly as a system and what it interacts with [I12].

One person cited the "high propensity for part numbers, not stock numbers [I11]" as a driving force for retaining materiel controllers, stating that materiel controllers could be eliminated in the future if the parts were coded with NSNs.

Regardless of whether or not materiel controllers would still be required in the maintenance complexes, three individuals shared a common belief: the units' reliance on supply will become increasingly more intense.

> Reliability is important, but the sparing concept and pipeline are the most important factors [I10].

> We'll see less maintenance and more reliance on the supply system, and that's what scares most people. Will the supply system be able to do the job? If the supply system won't do it, then we're in big trouble [I2].

Quality Control

Various aspects of quality control were discussed by the respondents, but two were discussed in detail: contract maintenance surveillance and the possibility of bringing the quality control function under the commander.

Contract Maintenance Surveillance. Three people expressed dissatisfaction with the manner in which past contracts have been written and the difficulty and, at times, seeming inability to enforce them. Two different individuals cited a need for more experienced personnel to write and monitor the contracts.

> We're seeing with the newer systems like Scope Dial and the SRT that the contractor is supplying the spares as opposed to having to go through the supply system. Frankly, that's a much easier system for us to work. What we're going to need in that case is probably people that are more oriented to monitoring contracts or maybe more transportation oriented [I18].

> We should have specialists in that field--one individual who is specially trained to monitor contracts. It would require legal training as well as to know what punitive actions could be taken if a contractor was not doing his job. Our people really don't have the expertise to do this job [I24].

Five people advocated removing contract maintenance surveillance from quality control; one felt it should remain.

> I think the customer should be monitoring the contract, not just maintenance. The primary user--it's easier for them to monitor it [I20].

> I think XR should have that. We don't even get a copy of the contract over here . . . . I wouldn't mind monitoring the contract to make sure they're doing the job, but I don't see where we should actually maintain the contract and write it [I21].

Quality Control Under the Commander. Seven individuals discussed the possibility of bringing quality control under the commander in a function that would encompass both maintenance and

operations functions. Five opposed the idea; two supported it.

> When you try to combine operations and maintenance under one hat, I think we're biting off more than we can really chew. It would have to be a big section, to cover everything [I20].

> It's a workable thing. It can be done, but the proposal is for the wrong reasons. The proposal is because the self-inspection program is not working . . . . Once we get down the road and have the operator/maintainer, it's a good idea, but not right now [I2].

Other Quality Control Issues. Other areas received mention, but were not as widely discussed. Two individuals suggested that if PMI scheduling was moved to the work centers, quality control could easily monitor status with an automated system.

Chief of Maintenance Function

Four areas were discussed extensively during the interviews: maintenance analysis, maintenance training management, logistics support, and maintenance management information systems.

Maintenance Analysis. Thirteen individuals stated that they felt there was no need for maintenance analysis at the field level and/or that maintenance analysis would be more appropriate at a higher level. This was not an observation based on future expectations, but was viewed as an improvement which could take place immediately.

> . . . I think it's a waste of a resource. What we have is data gathering. We have very little analysis--by analysis I'm talking about actually manipulating the data and coming

> up with possible problems to solve. I think what we have is nothing more than a compilation of data that's presented without any manipulation [I16].
>
> Within C-E maintenance, we have not had analysis because of two things. Our chiefs of maintenance did not know what to ask for. They were not trained in what to ask for. And we developed our maintenance comm analysis folks with people from other fields who, because they weren't asked the right questions, didn't know what to do [I2].

Others cited low equipment populations as a reason to eliminate analysis at the field level. Five people disagreed, stating that maintenance analysis served a useful functio at the field level, but as one person stated,

> Five, ten years down the road, probably not, because hopefully we're going to be so automated that we'll be able to do that at centralized locations with real experts in the maintenance analysis business instead of often times trying to grow our own at unit level [I7].

Another person indicated that analysis was useful in units with large amounts of equipment [I15].

Twelve individuals commented on what type of maintenance analysis product which would be useful to unit level maintenance managers. Items cited included cross-feed, manpower and parts consumption, high failure parts, trends, and uptime rates by individual equipment items and individual units. But, as one person emphasized, the items selected should be critical to the mission: "it can't be late APRs [I11]". Four people stated that a divisional or command product should go further than simply statistics and cross feed items, though.

> Once you discover a bad actor, not just take action to increase acquisition, but analyze the cause of the problem, come up with a fix for that component, and/or if it can't be fixed, establish Air Force or command level special levels to support those systems when they're out in the field [I13].

> Nobody ever says this equipment is giving us heck and we should replace it . . . . If they start seeing trends, send out some questionnaires. Ask us what we see as the problem. Ask us for inputs [I22].

> A perfect analysis would tell me this is the data we used, this is the criteria we used, and these are the results, and these are our recommendations based on these results, with the rationale for it . . . . Now, most analysts can't give you the recommendations because they aren't communicators, they're data people . . . and along the way, we missed some good opportunities, because there is a role for analysis and it should be done the way we do maintenance, on the exception basis [I18].

HQ AFCC/LGS was cited as having a notable analysis program which "pinpoints problems and doesn't repeat itself [I18]."

Maintenance Training Management. Six individuals stated that they felt that maintenance training management would probably cease to be a separate function under the chief of maintenance. Three felt it should be combined with the squadron training function or with quality control.

Logistics Support. Three people stated that logistics support should be removed from the maintenance complex and placed either in unit level plans and programs or at a higher level.

> The individual down at the unit level does not have a broad enough knowledge of where, when, what and how that system

> is going to be used, who's going to use it, or anything else to determine logistics support for it. They have to depend on someone with a big picture perspective in order to do that job. Right now we've got three different levels working at the same thing--the unit, the division, and AFCC people . . . . Why [110]?

Two people, however, cited as a need for more local planning in conjunction with the organization supported.

Maintenance Management Information Systems. Responses in this area covered the automated systems currently used by maintenance management at the field level and those which have been programmed. Six individuals felt that the new CAMS program would be an improvement over MMICS, due to an expected increase in capability, file space, and user friendliness. Because of this expected user friendliness, four people expected that the role of files maintenance would be minimal or eliminated at the field level. If files maintenance continues to be necessary, however, one individual suggested that since "CAMS will cover everybody," responsibility for files maintenance should not remain in the maintenance complex [12].

Five people felt that great savings could be garnered by combining the inputs of ESR, MDC, and historical files and entering the required information simultaneously.

> You should computer link MDC and ESR, thereby ESR would tell you, hey, I had an outage at this base. It lasted this long and now it's back up. The MDC then, using the same job control number, would then add into that data base saying this outage occurred, it was this component, and this was the

> corrective action. So you get the total picture of what caused the outage, how long it took to restore, how long your equipment was down, but you did it in one-tenth the time with one-tenth the manpower [I24].
>
> We generate thousands of documents and we input thousands of inputs on MMICS terminals to MDC data. That same data is what goes into historical files. Why? Why do we need two redundant systems [I10]?

One person advocated increasing reporting requirements for ESR and MDC.

> What we should do is establish a data base beginning with the acquisition, keep the data base on the system until it's dead, the entire life cycle. What we're chartered with is life cycle management. If you do that, you can track the entire supply history, the entire performance history, the entire modification history [I18].

Four people saw problems with automation that would have to be resolved, all involving data proliferation.

> The computer we have all around, the Z-100s. It's going to save manpower? No. It's going to increase productivity, but it's going to give the colonel more information to ask more questions . . . . Giving me a computer out there does not save a body; in fact, it costs because you've got to feed it. But the ultimate thing is quicker response [I11].
>
> With the increase of improved communications systems, I think also there's going to be a danger of oversupervision . . . . Division commanders or even functional managers up at the headquarters would be able to direct or make decisions at that level that probably should never be made at that level because they're too distant from the people formulas and other situations [I3].

Automated technical orders will become more common, according to three individuals.

> Automate the program, issue them on microfiches. I think you could probably get a fifteen percent decrease in the

workload just with tech orders and time compliance tech orders and modifications [I24].

Three people wanted to see local data bases kept on stand-alone microcomputers, with or without a tie-in to higher headquarters' computers.

Data base updates should be executed at a higher level, according to three individuals.

> People have no idea of the amount of labor that's expended when we get an STS revised. The same thing happens when we make what appear to be very minor revisions to command JQSs, and it's just tremendous amounts of work in trying to get the data base updated and purified, get all the mistakes out that resulted . . . . There should be some way to centrally update that data base [I13].

Categories of Maintenance Complexes

Statements about maintenance complexes broke down into several areas: satisfaction/dissatisfaction with categorization based on DMMAs, suggestions for management structures, and a strongly perceived need for reduction of overall functional requirements.

Categorization Based on DMMAs. Eleven of those interviewed expressed dissatisfaction with categorization of maintenance complexes according to authorized direct maintenance manpower authorizations.

> I feel like they put too much emphasis on the number of people rather than on the mission. That was the primary basis for the category complexes, to try to develop the procedures required to meet the mission, not to meet the number of people, and I feel like somebody needs to go back and re-look at the maintenance categories [I20].

> There should be some other factors--how many work centers, how many different AFSCs [I15].
>
> It should be more toward how many major systems you have [I23].

One individual stated support for categorization by DMMAs, and one individual was neutral.

Suggestions for Structure. Several people had suggestions for re-structuring maintenance management complexes in AFCC, two of which were significant departures from current organization. One individual advocated functional alignment.

> What we need to do, probably, is eliminate DO and LG and organize by function and have the ops and maintenance people of the same function working for the same person [I11].

This idea was proposed in later interviews, but the only strong responses were negative. Another individual suggested that communications units should be placed under the using commands rather than AFCC.

> If each one of the major commands has its own comm division, and each comm division has its own units under its area of responsibility, and each command has its own peculiarities, why do you need AFCC as an overhead structure when those kinds of things that affect everybody can be levied upon all of the command comm divisions by DCA? . . . . It's kind of presumptuous for AFCC to make electronics or communications or ADP or systems information policy for SAC from Scott when SAC could do it from Omaha for themselves, based upon their own needs, as opposed to Langley and TAC's needs [I5].

Another suggestion was closer to the present structure.

I would rather see a maintenance unit set up according to its mission and give the chief of maintenance manpower for whatever MET feels should be authorized in a fair and impartial way, and give the chief of maintenance the authority to set up his maintenance staff and work centers as he sees fit [I14].

One individual cited a need for the structure to be a strict "stovepipe" from AFCC down to the field units.

I find it very awkward the way that business is being done right now in that there is no clean structure from AFCC down to the lowest field unit as to where the readiness center and job control is located, or who it's located under. Sometimes it's ops, sometimes it's maintenance, and that's no way to do business . . . . We cross lines all the way, and it's dumb [I4].

Reduction of Requirements. Eleven individuals cited a strong need to reduce overall requirements for field level units in order to reduce those time-consuming requirements which are perceived to be unnecessary and unproductive.

I think we're doing many things today because of two factors. One, we've done it that way forever, or two, we have weaknesses someplace and the job wasn't getting done so we overreacted and we permitted a management policy which corrected that situation, but in actuality compounded it [I10].

QC is tasked with so many checks and cross-checks that it's a very large job and many of these checks and cross-checks accomplish absolutely nothing except filling a square [I24].

We patterned our maintenance structure after the aircraft maintenance people. We need to step back and say why are we doing some of these things [I18]?

I had this interesting message that came down and asked why do we have quality control checking to see that logistics support checks to see that the work center supervisor

> checks to see that the tech order distribution office, which is run by quality control, has requisitioned the TO for the new equipment coming in. Now that's an example of what we've done [I2].
>
> CAMS is far too complicated. It's far more than we need. The reason that it is so complicated is these existing regulations that put so many requirements that you accomplish the same job in twenty different places [I24].

The last quoted individual recommended that a civilian firm be hired to do a time and cost analysis. In his view, the MET or any other military organization would be unacceptable to do such a study because they "would use as guidelines the regulations that we need to get rid of" and because "too many sacred cows" would be protected.

One person clearly expressed an idea which had permeated all of the twenty-four interviews.

> They want to reaccomplish the manning structure of the chief of maintenance functions. I advocate before we look at the manning structure, measure how much they do, how they do it, let's really take a good hard look at what we are doing. Is what we are doing really needed or is it nice to have? We're not in the mode of operation of nice to have anymore. We're in the mode of operation of do more with less. The nice to have things are no longer affordable; they cost too much [I10].

VI. Conclusions and Recommendations

The military organization, by its very nature, must be at the forefront of change, adjusting constantly by attempting to match newly devised advances in technology to mission needs while confined by budgetary considerations. In addition, older, established activities must be examined and analyzed to determine their continued suitability in the newly evolved environment. The end product of this process is the fielding of equipment and personnel at the unit level in direct support of the required mission, and management functions provide the required interface between the supported and supporting activities.

When events can be predicted which will have a significant effect on the organization, it is good management practice to plan an overall strategy to cope with the expected changes, with milestones established toward the implementation of that plan. AFCC is constantly making adjustments in an effort to provide mission support effectively and efficiently. Fundamental changes are expected to occur in AFCC which will require changes in the established maintenance management structure and policies. The conclusions and recommendations for such a structural shift are premised on certain assumptions.

Assumptions

First Assumption. The first assumption is that the Air Force

and the Air Force Communications Command will continue to place strong emphasis on increasing the reliability and maintainability of their equipment. All of the twenty-four individuals interviewed firmly believed in AFCC's commitment to this initiative and supported its continued progress.

Second Assumption. The second assumption is that there will not be a return to a peacetime draft. The recruitment and retention of highly qualified personnel will become more difficult in the next few decades and capital, while limited, will become more easily obtained than manpower.

Third Assumption. The third assumption is that life cycle costs will be emphasized over purchase prices. As older equipment becomes increasingly costly to support logistically, it will be replaced.

These three assumptions underlie the conclusions and recommendations set forth below.

Conclusions

Structure. Just as data automation and communications-electronics became inextricably intertwined, so will unit level operations and maintenance functions. Black box maintenance, remote monitoring, regional maintenance centers--all point to unit level operator/maintainers. As their numbers increase, the traditional lines between the two areas will become less distinct. Yet certain

management problems are readily identified. Because the majority of their duty time will be devoted to operations, rather than maintenance, tasks, operator/maintainers will almost certainly be assigned to the operations divisions. As the number of "true" maintainers shrinks, their need for a separate support structure also diminishes. The operator/maintainers will have to cross divisional lines and function through two chains of command for certain support, notably maintenance training and maintenance control. Such a situation invites confusion and is not likely to be tolerated for very long.

Having concluded that restructuring is necessary, two possibilities have been proposed. The first is for AFCC to relinquish these personnel to the supported units. This is not likely to be anything but a choice of last resort for AFCC. The other possibility is functional alignment. While such an alignment was not received favorably by a majority of individuals interviewed, their answers were given in the context of present situations. A pre-established "boiling point" could be established to determine when functional alignment would be implemented, based on the numbers and types of equipment fielded.

Functional alignment would easily fit into some of the recommendations and projections made by those interviewed. The quality control activity could include both maintenance and operations personnel, thereby enfranchising the operations function while

remaining at the division level, where it was perceived to be the most beneficial. Since it has been identified as one of the most effective tools available to the chief of maintenance, it could then provide benefit to the entire unit.

As automated training becomes more common, software programs will almost certainly be used to automatically update training records as tasks are mastered. Separate unit training and maintenance training management will become increasingly inefficient, and some would argue that it is right now. A single unit training management function could also incorporate such areas as air traffic control certification and evaluation.

If AFCC restructures its units into functional areas, new methods for categorizing units will be required. A categorization based on both the mission and the types and numbers of organizations supported would authorize the needed overhead manning in a more equitable manner than the present structure.

Automation. Regardless of the structure which the maintenance complexes assume, improvements in automation should decrease some of the administrative workload of unit personnel. One possibility is the consolidation of the ESR, MDC, and historical files information such that a single input would update all systems simultaneously. Files maintenance will diminish as systems become more user-friendly and as software is developed to update data bases at the command level.

An automated system will render the plans and scheduling and materiel control functions an unnecessary luxury. Responsibility for tracking these activities will be placed in the work centers and overseen by quality control.

Immediate Needs. Several areas of responsibility were widely discussed and indicated that immediate attention was needed.

Maintenance Data Collection. The maintenance data collection program was the focus of widespread dissatisfaction. This program requires a considerable number of man-hours, yet only one person felt that its existence was justified. Either the data serves a useful function and unit education as to its importance is insufficient, or the data program does not serve a useful function. If either of these conclusions are correct, then action is warranted.

Maintenance Analysis. The maintenance analysis function is not being used effectively at the unit level. While more and better training might be in order, the primary question must be about the suitability of such a function at this level. Most individuals felt it was not suitable. They wanted higher headquarters to consolidate the data, which could easily be done with the right software program, and present it in a form which they found usable. A comparison between individual units and equipment was requested. This type of information could lead to misuse, however, unless accompanied by

other essential information as the unit skill levels, authorized versus assigned, etc. When uptime rates are compared between units, it becomes easy to conclude that those units with the highest rates are the most efficient, when in fact a unit with fewer assigned personnel and a lower uptime rate may in fact be using its resources more efficiently. Maintenance analysis appears to be most appropriate at the command level, and should be made optional at the unit level. Command analysis could identify trends command-wide as well as by individual units. Periodic reports should be distributed featuring cross-feed items.

Technical Control. The transfer of technical control to the maintenance complex received a great deal of support. Subsequent to the completion of these interviews, AFCC announced that such a transfer would occur effective 1 August 1985.

Civilian Study. The one suggestion that could provide the greatest impetus for change was the recommendation for a civilian study of the AFCC regulations. The duplication of requirements and difficulty of readability of the regulations indicate that revision is in order. While this would reduce part of the workload, it is more important to examine the necessity of all required tasks. Increased automation will only exacerbate current problems as the amount of data available to managers steadily increases. It is easy to retain unnecessary vestiges of the past, harder to critically examine their

continued suitability. Several drawbacks are apparent. Such an approach would be costly, requiring the same economic approach as the commitment to reliability and maintainability entail, namely, a consideration of life cycle costs rather than simply immediate costs. Second, a hazard exists of voluntarily commissioning a study and then being compelled to accept its recommendations in toto. However, the advantages of this approach would outweigh the disadvantages.

Recommendations

1. Recommend that AFCC managers develop initiatives to cope with the fundamental problems posed by increasing numbers of operator/maintainers.

2. Recommend that AFCC examine the benefits derived from the MDC program to determine if the program should continue in its present form. If the MDC program is retained in substantially the same form as at present, recommend AFCC institute a program to periodically inform the units of the benefits derived by AFCC and the units.

3. Recommend that maintenance analysis be made optional at the unit level.

4. Recommend that AFCC examine the feasibility of funding a civilian study of current regulations.

Appendix: Guided Interview

I. Interview Data

Name:

Rank:

Location:

Date:

Office Symbol:

AFSC:

Position Title:

Autovon #:

II. Experience

No. years in AF comm-electronics:

No. years as LG/LGM:

No. years unit-level maintenance manager (not LG/LGM):

No. years maintenance staff officer/NCO (division or command):

III. Background Information

At present, there are three major trends which will affect maintenance management in the future:

1. A push for higher reliability/maintainability in equipment.

2. The recent merger with data automation.

3. The recommendations of the Air Force 2000 study for greater dispersal of communications units.

IV. Assumptions of the Individual

What major changes do you expect to occur in AFCC maintenance (over the next two to three decades) in:

1. Equipment.

2. Manpower and personnel.

3. Locations (including the possibility of regional maintenance centers).

V. Responsibilities of Maintenance Management

1. Maintenance Activities

Topics to include:

- manpower/AFSC requirements
- test equipment
- bench stock and special levels
- materiel control
- historical files
- materiel deficiency reports (MDRs)
- time-compliance technical orders (TCTOs)
- technical publications
- corrosion control
- due-in-from-maintenance items (DIFMs)
- training and records
- logistics support for new systems
- conditions for zero on-site maintenance technicians
- the role of technical control (an operations activity)
- the smart machine/dumb operator concept

2. Maintenance Control

A. Job Control

- job status documents
- equipment inventory documents
- job priorities
- technician availability and notification
- equipment outages
- coordination for external support
- MMICS
- Equipment Status Reporting (ESR)
- maintenance vehicles
- data transmission, means and network

B. Plans and Scheduling

- maintenance plan
- master PMI schedule
- TCTOs
- materiel control reconciliation/command assists

C. Materiel Control

- DIFM control
- WRSK and MSK
- TCTOs
- NRTS items
- local manufacture requests

3. Quality Control

- MSEP
- C-E facility records
- NRTS
- inspections and evaluations
- technical publications
- contract maintenance surveillance
- fuel handling surveillance
- MDRs

4. Chief of Maintenance

A. Maintenance Analysis

B. Files Maintenance

C. Logistics Support

D. Maintenance Training, including ancillary

E. Chief of Maintenance

VI. Maintenance Complexes

Do you feel that the maintenance management structure as currently established will continue to meet mission requirements in its present form? If not, what suggestions do you have for restructuring maintenance management and the complexes?

VII. Final Remarks

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The Air Force Communications Command (AFCC) is subject to external pressures which influence management structures and decisions. Four external pressures currently influencing AFCC are technology advances, budgetary and demographic considerations, and the Soviet threat. This thesis examines those pressures and AFCC initiatives to cope with them. Twenty-four managers in AFCC were interviewed in an exploratory survey to determine what effects these pressures and the AFCC initiatives will have on maintenance management at the unit level in AFCC.

Four recommendations are made. First, functional alignment of the units, with overhead manning based on mission and types and numbers of units supported, is suggested. Second, AFCC should examine the maintenance data collection program to determine if changes are needed. Third, AFCC should make maintenance analysis optional at the unit level. Fourth, AFCC should examine the feasibility of funding a civilian study of current regulations.

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